

Claims

1. Molten Carbonate Fuel Cell stack comprising a plurality of cells separated by an electronically conductive material which is impervious to gas, characterized by the combination of the following elements:

- a positive reservoir component, external to the cathode of the first cell, on the positive side of the stack, wherein said reservoir consists of one or more porous layers of electronically conductive material and comprises at least one gas distributor and
- a negative reservoir component, external to the anode of the last cell, on the negative side of the stack, wherein said reservoir consists of one or more porous layers of electronically conductive material,
wherein both the reservoirs are in use exposed exclusively to fuel gas environment and are inaccessible to the oxidant gases.

2. Molten Carbonate Fuel Cell stack as defined in claim 1,

wherein the positive reservoir is separated from the cathode of the first cell on the positive side of the stack by means of an electronically conductive material which is impervious to gas.

3. Molten Carbonate Fuel Cell stack as defined in claim 1,

wherein the negative reservoir is separated from the anode of the last cell on the negative side of the stack by means of an electronically conductive material which is impervious to gas.

4. Molten Carbonate Fuel Cell stack as defined in claim 1 or 2,

wherein the positive reservoir element is in use accessible to gases at least on one of the faces formed by the lateral surfaces of the cells, in which fuel gas is present and which is separated from oxidant gases.

5. Molten Carbonate Fuel Cell stack according to the claims 1 to 4,

wherein the positive and the negative reservoirs are in use in communication through the electrolyte with gaskets which are in contact with the matrixes of the cells.

6. Molten Carbonate Fuel Cell stack according to the claims 1 to 5,

wherein the positive and the negative reservoir are in use accessible to the fuel gas at the fuel inlet side while the other three faces formed by the lateral surfaces of the cells are in use exposed respectively

- to the oxidant gas fed to the stack,
- to an exhausted oxidant gas outlet zone and
- to an exhausted fuel gas outlet zone.

7. Molten Carbonate Fuel Cell stack according to the claims 1 to 5,

wherein the positive and the negative reservoir are in use accessible to the fuel gas at the exhaust fuel outlet side

while the other three faces formed by the lateral surfaces of the cells are in use exposed respectively

- to the oxidant gas fed to the stack,
- to an exhausted oxidant gas outlet zone and
- to the fuel gas fed to the stack.

8. Molten Carbonate Fuel Cell stack according to the claims 6 or 7,

wherein gaskets are attached to the perimeter of the face, some parts of said gaskets are in contact with portions of the cells matrix and wherein in use on every face of the cell stack the gas is contained in a zone which is separated from the external environment.

9. Molten Carbonate Fuel Cell stack according to the claims 1 to 8,

wherein every cell of the stack comprises an anode, an electronically conductive fuel gas distributor, a cathode, an electronically conductive oxidant gas distributor and an electrolyte containing matrix.

10. Molten Carbonate Fuel Cell stack according to the claims 1 to 9,

wherein in porous gaskets compressed on the perimeter of the faces , the portions which connect the matrix of the first cell at the positive pole to the matrix of the last cell at the negative pole, have a volume of residual porosity in the gaskets which is < 4%.

11. Molten Carbonate Fuel Cell stack according to the claims 1 to 10,

wherein the porous layers of the positive and of the negative reservoir comprise at least 50% of Ni.

12. Molten Carbonate Fuel Cell stack according to the claims 1 to 10,

wherein in the porous layers of the positive and of the negative reservoir at least 50 wt% is Cu or Ni+Cu.

13. Molten Carbonate Fuel Cell stack according to claim 12,

wherein the porous layers of the negative reservoir comprise elements consisting of anodes which are identical to the ones of the cells.

14. Molten Carbonate Fuel Cell stack according to claim 13,

wherein the porous layers of the negative reservoir comprise elements consisting of anodes which are identical to the ones of the cells.

15. Molten Carbonate Fuel Cell stack according to the claims 1 to 14,

wherein the number of the cells is >50 and their area is >3500cm².